

long-lived legal rights and competitive advantages that are developed or acquired by a business.² In this paper, we decompose intangible assets into those two components; referring to long-lived legal rights as organizational capital and competitive advantages as economic rents.

A firm's market value is the present discounted value of the income expected to be generated by the assets of the firm in the future. A firm's book value is the depreciated value of what past and present investors have put into the firm, as measured by accounting standards. A firm's market value will diverge from its book value for several reasons, including:

- (1) inflation,
- (2) divergence between real and accounting rates of depreciation,
- (3) organizational capital,³
- (4) quasi-rents,
- (5) monopoly rents.

Most of these factors cause the market value of any viable firm to exceed its book value. The first two factors are reasons why market value may differ from book value even in the absence of intangible assets. The next three factors represent intangible assets. These intangible assets, and other factors, can affect the market value of a firm while leaving its book value unaffected. For example, the rate at which expected income is discounted could change for reasons of time preference or risk. Expected income before discounting can also change due to changes in any of the above listed factors. We discuss each of these factors in turn.

² This definition is from Williams, Jan R. and Martin A. Miller, *GAAP Guide 1993*, Harcourt, Brace, Jovanovich, New York, 1993, p. 21.01.

³ The term "organizational capital" comes from Cornell, B. and A. Shapiro, "Corporate Stakeholders and Corporate Finance," *Financial Management*, Spring 1987, pp. 5-14. The bulk of a firm's intangible assets will take the form of organizational capital.

Inflation following the original investment causes the investment's dollar price to rise merely because the price is stated in dollars that are worth less than before. Hence, the original cost method usually underestimates the true value of a firm's tangible assets, because it values those assets at the time of purchase, which might have been many years in the past.

The book value of assets equals their original cost minus accounting depreciation. There is no reason to expect real, economic depreciation to equal accounting depreciation. Accounting depreciation usually follows a schedule specified by the tax code. Economic depreciation, which market value reflects, depends on changes in the actual usefulness of the asset. A divergence between economic and accounting depreciation will be reflected in a divergence between the market and book value of the assets.

Organizational capital refers to a firm's non-physical assets created by its employees and managers. Organizational capital includes all of the business relationships of a firm, that is, the myriad of implicit and explicit contracts with managers, employees, suppliers, and customers. Organizational capital also includes the value of the information embedded in a firm's operating procedures; the value of its brand name and reputation; and the value of its supply and distribution networks. Organizational capital is not derived from monopoly power and it does not disappear in a competitive environment.

Economic rents include both quasi-rents and monopoly or locational rents. Economic rents are payments to factors of production in excess of the amount necessary to secure the services of those factors. Economic rents are an important source of information in an economy. They signal the potential for above-normal profits and thus induce entry and increased investment. Absent some "barrier," entry and increased investment will eventually reduce profits to their normal levels, and the

existence of above normal profits directs resources to their highest valued use.⁴

Quasi-rents refer to rents that exist only temporarily, until they are competed away. Quasi-rents can be earned by a firm on its physical assets and on its organizational capital. Quasi-rents can arise from the foresight or luck to have invested in the right assets at the right time. For example, a new technology might make existing assets more valuable. With regard to the cable industry, for example, the revenue potential from digital compression foreseeable today may not have been foreseen in the past.

Monopoly or locational rents are due to market power. Unlike quasi-rents, monopoly rents do not dissipate in a competitive environment. While these rents also serve as a signal, some "barrier" impedes entry and the rents persist.

III. Economy wide market-to-book ratios

In general, there is no reason to expect the accounting or book value of assets to approximate the market value of those assets. This fact was brought home with great clarity in the savings and loan crisis, which resulted in part from the practice of bank regulators mistaking the book value of mortgages held as assets by thrifts for their market value, which had declined disastrously.

Even in the absence of market power, inflation, accelerated depreciation schedules and organizational capital will often cause the market value of an ordinary firm's assets to exceed its book value.⁵ In particular, the value of a firm's assets in an acquisition will generally far exceed the book value of the assets.

⁴ On the general topics of rents, profits, and competitive returns, see Stigler, George, *The Theory of Price*, Fourth Edition, 1987, chapters 11 and 16; and McCloskey, Donald N., *The Applied Theory of Price*, Second Edition, 1985, chapter 14.

⁵ See the appendix to this paper for a more detailed discussion.

Table 1 shows the average equity market-to-book ratios from 1977 to 1992 for all firms in the S&P 500 index. The average ratio has always exceeded one; it equaled 2.65 in 1992. Because long-run monopoly rents cannot be ubiquitous for all the firms in the S&P 500, monopoly power cannot account for the excess of market value to book value. Furthermore, since the market value of U.S. firms generally exceeds their book value, it is unreasonable to attribute that excess to monopoly power for any industry, including the cable television industry.⁶

IV. Harm from adopting an original cost ratebase

The Commission's tentative conclusion to use the original cost of the plant in service as the rate base means that cable operators will earn returns only on tangible, accounting-based costs — on the depreciated book value of assets. That policy is supportable only if the entire difference between such costs and market value are monopoly rents. As the evidence above indicates, that cannot be the case.

The definition of rate base contemplated by the Commission will cause under-investment in the cable television industry in the future. There will be no incentive to invest in cable industry assets if only part of the market value of those assets are allowed to earn a competitive return.

If eliminating intangible assets from the rate base were viewed as a one-time tax on previously accumulated capital, a tax which is neither anticipated nor expected to be repeated, then the tax would not be distortionary. The investment already occurred and cannot be undone. Such taxes, however, do create distortions if investors worry that the

⁶ In a recent decision, the Commission discussed q , the ratio of a firm's market value to the replacement cost of its assets, rather than to its book value. The Commission noted a number of reasons why market value might exceed replacement cost in a competitive industry, including measurement errors dealing with intangibles and above average risk. All these reasons also could make market value exceed book value. "In the Matter of Competition, Rate Deregulation and the Commission's Policies Relating to the Provision of Cable Television Service," FCC 90-276, Adopted July 26, 1990, ¶59.

government will impose another such tax in the future.⁷ The possibility of another levy of this type increases investors' uncertainty about investment returns, leading them to apply a higher threshold rate of return to future investment projects. Therefore, projects that would have been undertaken will be foregone, hurting both cable operators and consumers.

There will be a deleterious effect of the Commission's proposal on existing cable industry assets as well. Once the rate base is defined to exclude or undervalue certain assets, it will reduce the incentive to repair and maintain those assets. Existing assets will be allowed to decay, and there also will be a diminished incentive to upgrade equipment in keeping with technological developments.

In sum, the incentives with regards to repairing, maintaining, and upgrading existing assets, and with regards to expanding the industry, will be perverse. Consumers will be harmed.

The use of original cost also could have serious financial consequences for the cable industry. Many cable systems changed hands in the late 1980s at prices far in excess of the book value of the assets acquired. The difference between the seller's book value and the acquirer's price was allocated in varying proportions to a write-up of tangible asset value, to amortizable franchise and subscriber list values, and to goodwill. If the Commission proposes to exclude all of this from the rate base, it will deprive these systems of a large part of their asset values that is not attributable to monopoly rents. The practical result may be that some systems' earnings fall by so much that they will be unable to service their debt.

This problem is not limited to those systems that recently changed hands, it affects all systems. Systems that did not change hands nevertheless have a market value that in all probability exceeds book value.

⁷ See, Barro, Robert, "Retroactivity—Bungled Larceny," WSJ, Aug. 17, 1993, p. A14 for a discussion of taxes on prior behavior and their distortionary effects.

To use original cost to value such systems is to deprive them of property value that has no connection to monopoly profits.

V. Summary

The original cost method usually underestimates the true value of a firm's tangible assets, because it values those assets at the time of purchase, which might have been many years in the past. Replacement and reproduction cost methods attempt to correct this deficiency, but these methods share a second and potentially more serious problem with the original cost method; they omit intangible assets.

A cable system cannot effectively conduct its business without intangible assets, including customer goodwill, contracts, technical expertise, and a skilled management team. Original, reproduction, or replacement cost methods of valuing the ratebase ignore these important assets. Denying cable operators the value of their investments in intangible assets would effectively constitute the confiscation of that investment.

If the Commission shows itself willing to confiscate the value of past investments, it will be expected to do so again. Hence, if the Commission does not allow the rate base to reflect the value of all assets, tangible and intangible, there will be an under investment in maintaining existing assets and investing in new assets. The growth of the cable industry will likely be substantially impeded, making both cable owners and consumers worse off.

Appendix⁸

Consider the market-to-book ratio, MTB , as usually defined wherein the market value, M , may differ from its tangible-asset book value, B . In this case let $B = T$, tangible assets, and

$$MTB = \frac{M}{T}. \quad (1)$$

Consider alternatively, an accurate-accounting market-to-book ratio, MTB^* , wherein the true book value, B^* , is adjusted to account for inflation, I ; organizational capital, OC ; other factors, OF , such as quasi-rents, and the divergence between accounting and economic depreciation; and monopoly rents, R . For the accurate-accounting case, $B^* = T + I + OC + OF + R$, and

$$MTB^* = \frac{M}{T + I + OC + OF + R}. \quad (2)$$

Combining Equations (1) and (2) to find the ratio of MTB to MTB^* , yields

$$\frac{MTB}{MTB^*} = 1 + \frac{I}{T} + \frac{OC}{T} + \frac{OF}{T} + \frac{R}{T}. \quad (3)$$

Because Equation (2) includes an adjustment to B^* to account for the factors that cause B to differ from M in Equation (1), $M = T + I + OC + OF + R$ and $MTB^* = 1$. Thus Equation (3) can be rewritten as

$$MTB = 1 + \frac{I}{T} + \frac{OC}{T} + \frac{OF}{T} + \frac{R}{T}. \quad (3')$$

Equation (3') shows how to account for the components of value other than tangible assets. Each component's contribution to the market-to-book

⁸ The analysis here extends McFarland, Henry, "Evaluating q as an Alternative to the Rate of Return in Measuring Profitability," *Review of Economics and Statistics*, 1988, 614-622.

ratio's difference from one is the ratio of that value to tangible asset value. An example will show the simplicity of the concept.

Consider a firm that invested in plant in service for \$10. Since the original investment, another firm acquired the plant for \$18 for an ostensible market-to-book ratio of 1.8. If, in the time following the original investment, inflation added \$1 in (current dollar) value, organizational capital added \$5, other factors added \$1, and monopoly rent added \$1, then the entire market to book ratio can be accounted for by Equation (3').

$$1.8 = 1 + \frac{1}{10} + \frac{5}{10} + \frac{1}{10} + \frac{1}{10}$$

Knowing any three of the additional components allows the fourth to be inferred, because market value and tangible asset value are known.

Table 1
Market to Book Ratios for the S&P 500

<u>Year</u>	<u>Market/Book Ratio</u>
1977	1.20
1978	1.13
1979	1.15
1980	1.32
1981	1.12
1982	1.25
1983	1.41
1984	1.37
1985	1.69
1986	1.91
1987	1.84
1988	1.97
1989	2.40
1990	2.16
1991	2.59
1992	2.65

Source: Merrill Lynch

APPENDIX B

The Equity Cost of Capital for Cable Operators is High and Variable

I. Introduction

The equity cost of capital paid by six large cable operators is significantly higher than that paid by AT&T, GTE, and the Regional Bell Operating Companies. Moreover, among the cable operators examined here, there are considerable differences in the cost of their equity capital. These results suggest that cable operators should be allowed a rate of return on equity that exceeds the rate allowed for regulated telephone companies, and that setting a uniform rate of return for all cable operators is inappropriate.

The present results are based on an empirical analysis of the six cable operators whose stock price data readily accommodate risk premium analysis. The six companies do not constitute a representative sample. The results, however, do have implications for other cable operators and for other funding sources. In fact, the cost of capital for small cable operators is likely to be higher than that for large operators. And a cable operator that must pay dearly for capital in equity markets is likely to have to pay dearly for capital in debt markets too.

This paper motivates the standard methodology for estimating a company's market risk, β , which is the key parameter for measuring its equity cost of capital. Estimates of β are presented and interpreted.

II. Measuring the cost of equity

In the Notice of Proposed Rulemaking, the Commission notes that there are two common methods of estimating the cost of equity: discounted cash flow analysis, and risk premium analysis.¹ Neither method can be

¹ FCC, "Notice of Proposed Rulemaking," MM Docket No. 93-215, July 15, 1993, paragraph 51, and footnote 55.

tractably applied to the vast majority of cable operators, and the discounted cash flow method poses problems for even the largest cable operators.² Risk premium analysis, however, can be applied to large cable operators and inferences can be drawn for the others.

The use of risk premium analysis to determine the equity cost of capital relies on the fact that the equity cost of capital is paid to investors as the total return they receive on a firm's equity.³ The return is higher for a risky investment than for a safe investment. A firm's cost of capital exceeds the rate earned on an investment that is "risk free" corresponding to its degree of risk. Portfolio theory guides the proper measurement of risk and its relation to return.

In standard portfolio theory, required return measurement begins with the return commensurate with a risk free instrument (such as a U.S. Treasury Bill) and adds the return commensurate with the risk of the firm in question. Portfolio theory presumes that investors are not compensated for risks they can avoid. Only unavoidable risks lead to higher returns.

The most commonly applied portfolio model is the Capital Asset Pricing Model (CAPM), which receives prominent treatment in any finance textbook. The CAPM distinguishes between avoidable risk and unavoidable risk through a statistical comparison of the relevant firm's equity returns to total market returns. Risk which is unique to the firm, and hence independent of the market, can be avoided through diversification. Only that component of risk which is related to the market is unavoidable. The unavoidable component of a firm's risk translates into a higher equity cost of capital for that firm.

The size of the unavoidable risk, or market risk, is measured by a coefficient referred to as β , which measures the extent to which changes in

² The discounted cash flow method relies on the presence of regular dividends as a means of disbursing earnings to shareholders, and on a past earnings record that facilitates extrapolation to the future. In general, cable operators do not possess these characteristics.

³ Returns are the percent change in price from period to period. Total return includes both dividends and capital gain.

the firm's stock price are related to changes in the market price. If β is 1.0, then a 10 percent change in the market is associated with a 10 percent change in the price of the firm's stock in the same direction. If β is 1.5, then a 10 percent change in the market is associated with a 15 percent change in the price of the firm's stock. Firms whose β s are above one are riskier than the market as a whole.⁴

The next section uses the portfolio theory described here, to draw comparisons between cable operators and other firms.

III. Large cable operators' market risk relative to other firms

Value Line, which is an independent and widely used source of investment information, provides estimates of β for 3 cable operators. Table 1 shows those estimates and compares the Value Line estimates for cable companies to those for AT&T, GTE, and the Regional Bell Operating Companies. The β estimates should be interpreted as describing, in terms of unavoidable market risk, each company's risk relative to the market. The unavoidable market risk is the critical input to a firm's equity cost of capital. Thus, for example, Cablevision's market risk is 35 percent higher than the risk premium of the market as a whole, and its equity cost of capital is higher than the risk free rate by 135 percent of the risk premium associated with the equity market as a whole.

Table 1 also indicates that the three cable companies have much higher values of β than do telephone companies. Hence, cable companies are riskier investments than telephone companies and must earn a higher rate of return to attract capital. It follows that the allowed rate of return for cable companies must exceed the allowed rate for telephone companies.

⁴ The CAPM β is used to estimate a firm's equity cost of capital as follows. To the risk-free rate is added a term accounting for the equity market's return in excess of the risk-free return. If β is 1.0, then the firm's equity cost of capital is simply the risk-free rate plus the market premium. If β is 1.5, then the firm's equity cost of capital is the risk-free rate plus the market premium multiplied by 1.5. This relation is described algebraically as $R_C = R_f + \beta(R_M - R_f)$, where R_C is the firm's cost of capital, R_f is the risk-free rate, and R_M is the market rate of return.

Table 1:
Value Line Estimates of β for Cable and Telephone Companies⁵

Company	β
<i>Cable</i>	
Cablevision	1.35
Comcast	1.55
Tele-Communications Inc.	1.55
<i>Telephone</i>	
AT&T	.95
Ameritech	.85
Bell Atlantic	.95
Bell South	.85
GTE	.90
Nynex	.85
Pacific Telesis	.90
Southwestern Bell	.95
U.S. West	.90

IV. Estimates of the market risk of large cable operators

To verify the Value Line estimates of β and to obtain more estimates, we estimated β for the six large cable operators for which data necessary to calculate relevant and reliable β estimates were available.⁶ Three of the firms are the same as those estimated by Value Line.

The coefficient β can be estimated from the regression equation,

$$R_C = a + \beta * R_M$$

where a and β are estimated coefficients, and R_C and R_M are the rate of return on the individual cable operator and on the market. We used the S&P

⁵ Value Line, "Summary of Advice and Index," May 7, 1993.

⁶ The firms chosen were in the list of cable operators in Kagan, *The Cable TV Financial Databook*, June 1993. For inclusion, 80 percent of the firm's revenue must have been cable revenue, and the stock must have been trading regularly enough to allow reliable regression estimation. The six firms are Adelphia, Cablevision, Century, Comcast, Jones Intercable, and TCI.

500 to represent the market rate of return.⁷ We estimated the regression using weekly data from June 2, 1989, to August 12, 1993.

For the cable operators examined here, the market risk of individual cable operators exceeds the risk in the market as a whole, generally by 30 to 50 percent.⁸ Significant differences exist, however, among the β s for individual cable companies; they range from a minimum of 1.03 to a maximum of 1.53. Such differences in β suggest that different cable companies have very different costs of equity. Therefore it would be inappropriate to apply a uniform statutory cost of equity to all cable operators.

V. Conclusion

Using risk premium analysis to estimate the cost of equity reveals that large cable operators are riskier than AT&T, GTE, and the Regional Bell Operating Companies. This higher risk must be compensated for by allowing a higher rate of return on equity for cable operators than is allowed for telephone companies. The analysis also indicates that the level of risk varies among cable operators and that the cost of equity needs to be determined on a case-by-case basis.

These results, moreover, reach beyond the equity cost of capital for large cable companies, and have significant implications for the cost of debt capital, and for smaller cable operators. Other things equal, an operator with high equity costs is also likely to have high debts costs. And the cost of capital for smaller cable operators is likely to be higher than that for large operators.

⁷ We also estimated β s using the S&P 400 as the market rate of return, but the results were not significantly different, so they are not displayed. Because the S&P 500 is based on a wider selection of firms, results using that index are preferable.

⁸ Our β estimates for Cablevision, Comcast, and TCI are very similar to those obtained by Value Line. All six estimates are significant at the 95 percent level.

APPENDIX C

Why the Commission Should Not Adopt a Productivity Offset

I. Introduction

The Commission has solicited comments on whether "productivity offsets" should be applied under cable rate regulation and whether there is a valid economic basis to assume that "cable service has been, and will be, experiencing efficiency gains."¹ In particular, the Commission solicited comments on four options as productivity offsets: "(1) no productivity offset; (2) a consumer productivity dividend of 0.5 percentage points; (3) a telecommunications industry adjustment between 3.0 (AT&T) and 3.3 (local exchange carriers) percentage points; and (4) a different productivity offset for cable operators."²

For several reasons, we find that there is no economic basis to have a productivity offset for the cable industry. First, two of the candidates for measures of productivity offsets are drawn from rate regulation of the telephone industry.³ While there may be a reasonable basis for applying a productivity offset in the Commission's rate regulation of the telephone industry, neither the Commission's form of regulation of the cable television industry nor the industry itself is amenable to a productivity offset.

Second, there are no government-maintained measures of productivity growth for the cable television industry. Any productivity measures must rely on special industry studies.

¹ FCC, "Notice of Proposed Rulemaking," MM Docket No. 93-215, July 15, 1993, Paragraph 85.

² Ibid.

³ The adjustments of 3.0 for AT&T and 3.3 for local exchanges are based on FCC, "Policy and Rules Concerning Rates for Dominant Carriers, Second Report and Order," CC Docket 87-313, September 19, 1990. The 0.5 percentage point productivity dividend was implemented to ensure that some of the efficiency gains realized in moving from cost-of-service regulation to rate caps was passed through to customers. No "efficiency dividend" will result from imposing regulation on cable systems.

Third, productivity measures for the cable industry must account for rapid improvements in the quality of programming and service. Productivity improvements result in reduced costs, whereas programming and service quality improvements tend to increase costs. Cable operators have substantially improved the quality of service as well as improved operational efficiency. Historically, the effects of quality improvements on costs have more than offset the effects of efficiency improvements.

Fourth, reduction of annual inflation increases by productivity offsets is unwarranted based on recent experience with changes in competitive cable rates. Simple adjustments for inflation based on the GNP-PI index applied to the benchmark tables do not account for the quality-based and cost-based increases in service rates for the "competitive" systems between 1986 and 1992. To accommodate these quality-based cost increases for competitive systems would require an allowance for price increases above the GNP-PI index of nearly 5 percent per year per subscriber channel. Although some of the price increases may reflect costs that could be passed directly to subscribers under the benchmark rate regulations,⁴ other portions of the price increases may reflect costs that could not be passed directly to subscribers. The Commission should not consider reducing the annual rate adjustment based on the GNP-PI for productivity improvements alone without an even greater adjustment for price increases to reflect quality improvements.

Fifth, even if a measure of historical cable industry productivity were available, it is impossible to predict whether that rate would continue in the future, particularly under a new regulatory environment. The rate of productivity improvement in the industry is likely to decline under rate regulation.

⁴ Increases in programming costs and costs associated with public, educational, and governmental channels account for some of this price change. These increased programming costs would be passed through to consumers under the benchmark regulation. FCC, "Report and Order and Further Notice of Proposed Rulemaking, MM Docket 92-266, April 1, 1993, paragraphs 251-252.

For all of the above reasons, simply using the GNP-PI without any other adjustments for annual price changes of the benchmark tables is a conservative measure that is likely to favor consumers.

The Notice suggested comparing a system's rates per channel today to its inflation-adjusted rates per channel in 1986 as an alternative safe harbor to the benchmark rate structure.⁵ If the Commission adopts this safe harbor alternative, it would be inappropriate to reduce the inflation adjustments by productivity offsets without allowing adjustments for the additional costs of programming and service quality improvements. These latter adjustments may be greater than any productivity adjustment.

II. Productivity and price regulation for the cable industry are different from those for the telephone industry

The Commission has applied productivity offsets in the rate regulation of the telephone industry. In 1990, the Commission determined that regulated telephone companies were becoming increasingly efficient at providing regulated services; as a result, these services were becoming less costly in real terms.⁶ Consequently, rather than allow regulated rate caps to increase annually by an unadjusted general measure of inflation such as GNP-PI, the Commission decided to reduce the allowed annual rate of price increases under price caps by a "productivity offset," 3 percent for AT&T and 3.3 percent for local exchanges.⁷

The productivity offset for regulated prices of telephone services was applied under the following circumstances: (1) well-defined measures of

⁵ FCC, "Notice of Proposed Rulemaking," MM Docket No. 93-215, July 15, 1993, Paragraph 71.

⁶ FCC, "Policy and Rules Concerning Rates for Dominant Carriers, Second Report and Order," CC Docket 87-313, September 19, 1990.

⁷ Ibid. These productivity offsets were based in part on historical rates of price reductions under cost-of-service regulation and an assumed 0.5 percent consumer productivity dividend with greater efficiency incentives under price caps.

service output or service efficiency;⁸ (2) uniform quality associated with service;⁹ (3) easily documented price trends;¹⁰ (4) price trends that clearly indicated falling prices;¹¹ (5) easily available corroborating measures of productivity improvements;¹² and (6) movement from rigid federal cost-of-service regulation to a more flexible form of price cap regulation.¹³ None of these six characteristics applies to the cable industry, and consequently, there is no economic basis to assume that a productivity offset should apply to the cable industry.

8 For measures of output or efficiency for regulated telephone service, see FCC, "Policy and Rules Concerning Rates for Dominant Carriers, Second Report and Order," CC Docket 87-313, Sept. 19, 1990, Appendix C and Appendix D. In contrast, measures of output or efficiency for cable operators are more elusive. The FCC has implicitly selected basic channels per subscriber as the measure of output and regulated revenue per subscriber channel as the measure of efficiency, but other measures might equally well have been selected. Differences in quality confound the measurement of either output or efficiency for the cable industry. See Section V.

9 Quality of regulated telephone service is relatively constant across providers and over time. In contrast, quality of service (for example, the number of channels, the number and variety of satellite networks, the probability of a service interruption, two-way addressability, and levels of customer service) varies substantially among cable operators. Moreover, differences in local regulation of access for public, educational, and governmental channels lead to differences in quality of service for local interests. Finally, quality of service for cable television changes rapidly from year to year. See Section V.

10 When price caps were adopted in 1990, the FCC had previously regulated certain rates for AT&T and local exchanges for decades. Information on prices and even costs were readily available. In contrast, the FCC has never regulated rates for cable operators. Interpretation of historical rate information, where available, is confounded by changes in programming quality and local regulation.

11 Information available to the FCC in 1990 on regulated telephone rates clearly indicated that real prices were falling over time. FCC, "Policy and Rules Concerning Rates for Dominant Carriers, Second Report and Order," CC Docket 87-313, Sept. 19, 1990, Appendix C and Appendix D. A reasonable argument could be made for a productivity offset under these circumstances. In contrast, applying the benchmark rate formula to the Commission's cable rate survey data for 1986 indicates that real competitive prices for cable services have increased rather than fallen holding the number of channels and satellite networks constant. See Section V. A productivity offset does not make sense under these circumstances.

12 In 1990, the FCC could have referred to BLS measures of productivity improvements to reach a conclusion of productivity improvements in the telephone industry. No such government-sponsored productivity measures are available for the cable industry. See Section III.

13 See Section VI.

III. There are no government-sponsored measures of productivity for the cable television industry

The Commission recognizes the difficulty of measuring productivity improvements for the cable television industry.¹⁴ There simply are not any available measures of industry productivity growth. Neither the Bureau of Labor Statistics (BLS) nor any other government agency calculates any productivity indexes for cable television operators or related industries.¹⁵

Cable operators are part of Standard Industrial Classification (SIC) industry number 4841, a broad industry classification that also includes closed circuit television services, direct broadcast television services, multi-point distribution services, and satellite master antenna systems services.¹⁶ BLS does not maintain a productivity series for SIC industry 4841, but does maintain a labor productivity index for SIC industry group 481, telephone communications.¹⁷ It is the only industry group within the communications sector of the economy for which government-sponsored productivity indexes are maintained. SIC group 481 includes not only local exchanges and long-distance phone companies but also cellular phone companies and paging services.

There is no reason to expect that the productivity series for SIC group 481 would be an accurate indicator of productivity changes for a specialized

¹⁴ FCC, "Notice of Proposed Rulemaking," MM Docket No. 93-215, July 15, 1993, Paragraphs 83-85.

¹⁵ Department of Labor, Bureau of Labor Statistics, *Productivity Measures for Selected Industries and Government Services*, April 1993.

¹⁶ Executive Office of the President, Office of Management and Budget, *Standard Industrial Classification Manual*, 1987, Washington, DC: GPO.

¹⁷ Labor productivity is an inaccurate indicator of industry efficiency. It is measured as the ratio of output to hours of direct employment. It is subject to volatility in measurement because different types of labor are counted differently. A simple shift of labor from direct employment to a subcontracting agency changes the measure of labor productivity without changing the technical operations of a cable system. Labor productivity is also subject to substitution effects between labor and other factor inputs as relative factor prices shift.

industry within the group, such as local exchanges. When it adjusted price changes for productivity under price caps for local exchanges and AT&T, the Commission did not use the available government-sponsored productivity series. Instead, it relied upon industry studies of price trends.¹⁸ There is even less reason to expect that a productivity series for SIC group 481 would be an accurate reflection for a specialized industry, such as local cable operators, outside the group. Consequently, based on both Commission precedent and common sense, the BLS labor productivity index for SIC 481 is not a reliable measure of productivity improvement for cable operators.

IV. Productivity measures for the cable industry must account for rapid improvements in the quality of programming and service

Any productivity measures that are constructed for the cable industry should account for the rapid changes in the quality of cable service. Economists have long recognized the importance and difficulty of accounting for quality changes in productivity measures.¹⁹

Technological progress lowers costs, but quality improvements often raise costs. The combined effect of technological progress and quality improvements on productivity measures can be ambiguous. While technological progress and productivity improvements may have enabled cable operators to provide a constant-quality service at a lower cost, few if any cable operators have kept programming and service quality constant. For example, the quality of cable programming and service in 1986 was lower

¹⁸ Traditional measures of total factor productivity examine changes in the quantities or prices of all factor inputs as part of the explanation of output price changes. The FCC studies instead examine only changes in average output price without examining input changes. See FCC, "Second Further Notice of Proposed Rulemaking," 4 FCC Rcd 2873 (1989) Appendix C and Appendix E; FCC, "Policy and Rules Concerning Rates for Dominant Carriers, Second Report and Order," CC Docket 87-313, Sept. 19, 1990, Appendix C and Appendix D.

¹⁹ Debates over quality adjustments have included both inputs (See, e.g., I. Nadiri, "Some Approaches to the Theory and Measurement of Total Factor Productivity: A Survey," *Journal of Economic Literature*, 1970, vol. 8, no. 4, pp. 1137-1177) and outputs (See, e.g., W. Nordhaus and J. Tobin, "Is Growth Obsolete?" in *Economic Research, Retrospect and Prospect: Economic Growth*, (New York: National Bureau for Economic Research), Fifteenth Anniversary Colloquium, 1972).

than the quality of cable service in 1992. Comparisons of productivity of the cable industry in two years, such as 1986 and 1992, must account for the improved quality of service.

V. Reduction of annual inflation increases by productivity offsets to the benchmark tables is unwarranted based on recent experience with changes in competitive cable rates

The benchmark approach adopted by the Commission is one method of holding certain quality characteristics constant, in this case the number of channels and the number of satellite-based networks. The benchmark tables are based on rates that would presumably be charged by competitive systems in 1992. These are not necessarily the rates that were or would have been charged by competitive cable operators in other years.²⁰

If cable operators had improved efficiency between 1986 and 1992, costs and competitive prices to provide a given level of service, holding all quality characteristics constant, should have fallen. If it were possible to make comparisons between benchmark rates in 1992 and competitive rates in 1986, one could perform the following two-step exercise to compute price reduction and possible productivity changes between 1986 and 1992: (1) based on the 1992 benchmark tables, calculate regulated rates per channel for a system with its 1986 characteristics (number of channels and number of satellite-based networks); and (2) compare that competitive 1992 benchmark rate per channel (in 1992 dollars) with the actual 1986 rate per channel expressed in 1992 dollars. If the benchmark procedure captures all relevant quality characteristics of the cable system, then, with real productivity improvement, the real 1992 benchmark rate should be less than the inflation-adjusted actual 1986 rate.

²⁰ The benchmark tables are derived entirely from cross-sectional rather than time-series data on cable systems in 1992. Quality differences in programming and services among these systems in 1992 are relative small compared with quality differences between these systems as a group and the quality of service of competitive systems in another year. Consequently, it is difficult to make inferences from the 1992 benchmark tables about competitive rates in other years.

We performed this exercise. We examined separately different types of "competitive" systems (overbuilds, municipal systems, less-than-30-percent penetration) and "non-competitive" systems. (We have placed systems in competitiveness categories based on their 1992 attributes. We do not have information to place them in 1986 competitiveness categories.) We also examined separately systems that reported that they faced rate regulation in 1986 and those that reported that they did not.²¹

As part of this proceeding, the Commission collected data on prices and system characteristics from a sample of cable systems serving 419 cable franchise areas.²² The cable operators indicated that they served the same franchise area in 1986 in 268 cases; the Commission received complete 1986 data in 175 cases. Table 1 summarizes the frequency of the provision of 1986 data in the Commission's sample.

Table 2 compares the real 1986 revenue per subscriber-channel with rates that would have been allowed under the 1992 benchmarks. The first three columns of Table 2 present the results for systems that faced rate regulation in 1986. For most systems within each competitiveness category, the 1992 benchmark rate applied to 1986 characteristics overstated the actual real 1986 rate per channel. Average ratios (1992 benchmark rate:real 1986 rate) ranged from 119 percent for overbuilds to 166 percent for municipal systems. Clearly, these results do not support a positive productivity offset. Based on the benchmark formula, adjusted real competitive prices per channel have been rising rather than falling.

The inference to be drawn from this evidence is *not* one of productivity decline but rather of quality improvements that are not captured in the benchmark formula. As an example, cable systems in 1992

²¹ Slightly over half of the systems reported that they were not subject to rate regulation in 1986. However, these systems were subject to the possibility of regulation. Our analysis of the 1986 price data revealed no significant difference in the price characteristics of those systems reporting rate regulation and those reporting no rate regulation.

²² See FCC, "Report and Order and Further Notice of Proposed Rulemaking, MM Docket 92-266, April 1, 1993, Appendix E, "Survey Results: Technical Issues;" and FCC, "FCC Cable TV Rate Survey Database: Structure of Database and Explanatory Notes," February 24, 1993.

spent substantially more on programming than in 1986 as measured by licensing fees for cable networks. Licensing fees increased from \$261 million in 1986 to \$1.5 billion in 1992 (approximately an increase in 1986 from \$0.68 (in 1992 dollars) per subscriber month to \$2.26 per subscriber month in 1992).²³ The more than trebling of licensing fees for basic networks is not accommodated directly in the benchmark tables. Increases in direct programming costs alone could be passed along to subscribers under the new cable rate regulation.²⁴

The next three columns of Table 2 show similar results for systems that did not face price regulation in 1986.²⁵ Average ratios (benchmark rate:real 1986 rate) ranged from 102 percent for municipal systems to 140 percent for overbuilds. Again, these results do not support a positive productivity adjustment. Based on the benchmark formula, real prices have been rising rather than falling. The interpretation again is that the benchmark tables do not fully account for quality differences between 1986 and 1992 because they are based on cross-section data in which programming quality is relatively constant.

The last column of Table 2 indicates the annual real rate of price increase per channel in the benchmark table *in addition to the GNP-PI index* averaged across systems that both faced and did not face rate regulation in 1986. There is a remarkable consistency in the real annual growth rates of these rates per channel from 4.08 percent for systems with less-than-30-percent penetration to 4.77 percent for overbuilds.²⁶ These numbers in the last column of Table 2 indicate by how much the benchmark tables should be adjusted upward beyond GNP-PI to account for real quality improvements between 1986 and 1992.

23 Paul Kagan Associates, *Kagan Media Index*, March 30, 1993, p. 10.

24 FCC, "Report and Order and Further Notice of Proposed Rulemaking, MM Docket 92-266, April 1, 1993, paragraphs 251-252.

25 Although more municipal systems had a higher real price in 1986 than would be indicated by the benchmark table (3 to 1), the average ratio for the four systems still shows a higher benchmark than actual 1986 rate.

26 "Non-competitive" systems had real rate increase of 4.8 percent per year.

These results do not mean that cable operators have not improved efficiency. Like other industries that must invest in new technology to remain competitive, cable operators are constantly adapting new technology and providing more efficient services. These results, however, clearly indicate that the data collected by the Commission do not provide a basis to isolate the effect of productivity improvements. Any adoption of a productivity improvement offset by the Commission to reduce price increases for the benchmark tables should be coupled with a much larger quality improvement offset. The net effect of productivity and quality has been increasing prices per subscriber channel, for all competitive systems.

Historical quality improvement has been paid for by increasing prices. If regulated price increases are limited to inflation alone (GNP-PI), future quality improvements will be slower than quality improvements were between 1986 and 1992. If regulated price increases are limited to a level less than inflation, future quality improvements will be slower still.

The practical effect of a failure to account for continued quality improvement will be a reduction in the demand for cable. One impact of reduced demand will be reduced program diversity, injuring both consumers and the cable network industry alike.

VI. Future cable television productivity improvements are likely to be reduced by regulation

Productivity improvements in the cable industry in the past several years occurred without rate regulation. Particularly for an industry that is experiencing an increasing degree of regulation, we are aware of no economic basis to project that any past productivity increases will continue in the future. To the contrary, economists have generally found that regulation or increases in regulation are likely to detract from productivity

growth.²⁷ Consequently, any recent experience of efficiency gains in the cable industry is likely not to be repeated under price regulation.

VII. Reduction of annual inflation increases by productivity adjustment is inappropriate if Commission adopts alternative safe harbor

The Commission requested comments on whether "initial rates for cable service will be considered reasonable if they are no higher than 1986 rates adjusted forward both by a measure of inflation and a productivity offset."²⁸ Under this safe harbor alternative, it would be inappropriate to reduce inflation adjustments by productivity offsets without allowing potentially even greater adjustments for the additional costs of programming and service quality. As was noted for the benchmark tables, the costs associated with quality improvements for competitive systems rose more rapidly than productivity improvements between 1986 and 1992 even when the number of channels and the number of satellite networks were held constant. Under this safe harbor alternative, without holding the number of channels or satellite networks constant, the costs associated with quality improvements rose even more rapidly. The above reasons not to have a productivity offset for inflation adjustments of the benchmark tables are magnified when the number of channels and the number of satellite networks are not held constant.

²⁷ See, for example, E. Denison, *Accounting for Slower Economic Growth: The United States in the 1970s*, Washington: The Brookings Institution, 1979, pp. 127-131.

²⁸ FCC, "Notice of Proposed Rulemaking," MM Docket No. 93-215, July 15, 1993, Paragraph 71.
